CLEAN COPY

In theatrical productions, displays, exhibitions, and other events, rigging systems are used to suspend scenery, curtains, lights, and other equipment. A counterweight rigging common in theatrical applications, is typically comprised of a head block, floor block, counterweight arbor, loft blocks, lift lines, a rope handline, and a rope lock. One such well-known system is disclosed in FIG. 1 of U.S. Patent No. 5, 531, 297. The item to be lifted (the load) is attached to the lift lines on stage, which are run through loft blocks overhead and to a counterweight arbor. Weight is added to the counterweight arbor to roughly balance the weight of the load plus necessary hardware. A rope or handline for raising and lowering the item is connected to the counterweight arbor, run up to and through the head block, down through a rope lock, then through a floor block, and back to the counterweight arbor. In a balanced system, the load can be raised or lowered with very little force applied to the handline. If the system is not balanced, it may require a substantial force on the handline to prevent either the load or weight arbor from crashing onto the floor and other equipment. However, the rope lock is used to prevent the rope from moving as a result of an imbalance.

The present invention utilizes two shoes to grip the rope over a length of rope, distributing the gripping force instead of concentrated at a point or over a few gripping teeth. The movement of the shoes is restricted by guides, guide pins and slots, and the locking rollers engaging the back of the shoe, all of which ensure that the shoes close on the rope without any rotation of the shoes that might cause a concentrated gripping force instead of gripping the rope over the length of the shoes. The shoes close on the rope both in response to manual activation of a handle and in response to rope movement that would occur if the system is unbalanced. The shoes will not open unless the imbalance is overcome or corrected.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view of the rope locking device with the left side plate removed to reveal the mechanism.

FIG. 2 is a view of the rope locking device from the front.

FIGs. 3a, b, and c are front, top, and side views of the first shoe.

FIGs. 4a, b, and c are rear, top, and side views of the second shoe.

FIGs. 5a and b are a front and side views of the lock roller assembly.

FIGs. 6a, b, c, and d are the back, side, front, and lower views of the guide housing respectively.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates the preferred embodiment of the rope locking device 10. It is understood that the rope handline 11 in theatrical rigging is typically run vertically between a floor block and a head block. The rope lock mechanism is contained within a housing 21. In the preferred embodiment, the housing comprises a first and second side plate 22 and 23, a top 24, bottom 25 and rear 26, and a first and second mounting plate 27 and 28. The top, bottom, and rear 24, 25, and 26 and

A commercially available keyed plunger lock 150 attached to side plate 23 can be used to ensure that the handle cannot be moved into or out of the locked position. The plunger 151, when activated, passes through a hole 152 defined by side plate 23.

The means for manually closing the shoes comprises a handle 41, an upper and lower cam 100, 102 connected by a cam linkage plate 104, and linkage pins 148 and 149 and a locking roller assembly 106 connected to the upper and lower cams 100, 102 by an upper and lower linkage plate 101, 103, respectively, the linkage plates 101 and 103 being pivotally connected to the cams 100 and 102 at one end and pivotally connected to the locking roller assembly 106 at the other end. The locking roller assembly 106 comprises a roller base plate108 or a pair of parallel base plates 108a and 108b, and a plurality of rollers 110, 111 pivotally mounted on the base plate 108. Roller base plate pins 112, 113 extend outward from the base plate 108 and are received by a plurality of horizontal roller guide slots 114, 115 defined by the first and second side plates. The upper and lower cams 100, 102 are pivotally mounted on an upper and a lower cam pin 116, 117, respectively, which are received in upper and lower cam pin holes 118, 119 defined by the side plates 22, 23. The cam linkage plate 104 is pivotally connected to the upper and lower cam 100, 102, such that the rotation of the cams are equal. An upper and a lower linkage plate 101, 103 connect the roller base plate 108 to the upper and lower cams 100, 102 respectively. Consequently, rotation of either cam causes the other cam to rotate an equal amount and causes the linkage plates 101, 103 to move the locking roller assembly 108 horizontally, without any rotation or vertical translation.